Could nutrition sensitive cocoa value chains be introduced in Ghana?

Report of a brief study that identifies opportunities and bottlenecks

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The objective of this study is to establish whether nutrition sensitive cocoa farming could be realised in Ghana. After establishing the cocoa farming and nutrition context in Ghana, the study zoomed in on one cocoa producing sub-district to collect detailed data. Taking into account the local context and based on the collected data, the study concludes whether introducing nutrition sensitive cocoa value chains in Ghana is feasible and recommends how this could be done.

Keywords: Agriculture-nutrition linkages, cocoa, nutrition sensitive cash crops, Ghana, dietary diversity, IDDS.

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List of abbreviations and acronyms

CDI	Centre for Development Innovation, Wageningen UR
GAIN	Global Alliance for Improved Nutrition
GNP	Gross National Product
IDDS	Individual Dietary Diversity Score
MT	Metric Tonnes
Wageningen UR	Wageningen University & Research centre
WRA	Women of reproductive age

Summary

Nutrition sensitive cocoa value chains could be applied to link sustainable cocoa farming systems and improving the nutrition status of cocoa farmers. An analysis shows that under-nutrition is severe in many areas worldwide where cocoa is sourced from. The approach was first piloted in Indonesia, but has not yet been applied in Africa. CDI has conducted an exploratory study that takes into account key characteristics of both cocoa farming and nutrition security to establish whether nutrition sensitive cocoa farming could be realised in Ghana. Although Ghana is doing well compared to surrounding countries in addressing under-nutrition, indicators are still worrying. This is also true for the cocoa producing regions, where stunting levels remain high.

The study zooms in on the cocoa producing sub-district of Nyinahin (Ashanti province). This focus allows for the collection of detailed data, which enables the provision of well-informed recommendations. Quantitative and qualitative data were collected locally in individual and group discussions with farmers and women. Focus group discussions with women in villages surrounding Nyinahin provided relevant input on food consumption dynamics in households. A survey found an Individual Dietary Diversity Score of 4.29, which means that on average the interviewed women daily consume food from 4.29 out of 10 food groups. An IDDS score of 5 or higher will probably result in intake of sufficient micronutrients. However, the consumption of foods that are high in vital micronutrients could be much higher.

Although seasonal cocoa production in the Nyinahin sub-district has gradually increased, cocoa farms around Nyinahin are very disorganised. This negatively affects cocoa productivity and chances to successfully diversify cocoa farms, which would help to improve access to nutritious foods for cocoa farming households. Food crops like cassava, cocoyam and kontomire grow in cocoa farms and generally can be found in the lower areas close to water where cocoa trees cannot grow. Should cocoa farmers in Ghana be stimulated to grow more nutritious food crops, there should be an incentive that is clear and motivates farmers. Food crops produced, such as vegetables and fruits, can be used for own consumption and for selling, which would increase the availability of nutritious food locally.

Increased dietary diversity of people in cocoa producing areas in Ghana will contribute to lower levels of malnutrition and will stimulate higher productivity. To stimulate an increase dietary diversity, it is advised that the production and consumption of kontomire, papaya, white beans and ground nuts is encouraged. These commodities provide high levels of micronutrients and are accepted in local diets. Nutrition awareness creation would also be necessary to raise consumption of eggs, palm nuts, oranges and bananas. Farmers indicated that banana trees could serve as shadow trees for young cocoa trees. This would provide farmer households with improved access to fruit and at the same time serve a purpose for cocoa production.

Improved cocoa farming and improved nutrition need to go hand in hand at cocoa farms and in training programs in order to show farmers the benefits of good nutrition in terms of improved health (of children) and that higher production of healthy commodities means less food will have to be acquired from markets. It is crucial to also reach women, because good nutrition practices will be adopted in households when the women that collect and prepare the food prioritise the consumption of nutritious food. Opportunities could be explored to integrate recommendations in Ghana's agriculture and related institutions in cooperation with the Ghanaian Ministries of Health, Food & Agriculture and Cocoa Health.

1 Introduction

Cocoa production faces several challenges in the coming years.[1] As part of the ambition to look at alternative ways to structure cocoa production at farm level, cocoa trading companies have expressed interest to explore to what extent there could be a link between more sustainable cocoa farming systems and improving the nutrition status of cocoa farmers. This ambition could potentially be realised through a concept of nutrition sensitive value chains, which has been developed by the Global Alliance for Improved Nutrition (GAIN) and the Centre for Development Innovation (CDI) of Wageningen UR.[2] The purpose of the concept is to address under-nutrition in areas where cash crops are sourced. An analysis shows that under-nutrition, assessed through common nutrition indicators, is severe in many of these areas.

High rates of under-nutrition indicate that people, for example, suffer from lower cognitive development, are more prone to diseases, are less economically productive in life and that mortality rates are higher. It is argued that in the established agricultural system in which cash crops play a central role it is possible to improve access to healthy food through diversification and without reducing cash crop production, which would contribute to addressing the mentioned issues. Even more so, it would be possible to make a difference in the lives of those farmers and as a result, this will also lead to increased cash crop productivity. This approach was first piloted in Indonesia, where a nutrition sensitive cocoa value chain project is producing its first results. This project has been implemented by SwissContact in cooperation with GAIN and CDI and was funded by the Netherlands Embassy.

However, the nutrition sensitive cocoa concept has not yet been applied in Africa. For this reason, CDI has conducted an exploratory study in Ghana in order to assess whether it would be possible to implement the concept in local cocoa value chains. Furthermore, when the answer to this question is 'yes' the study would provide recommendations on how this could potentially be done, as the context is very different from the contexts in which nutrition sensitive cash crops have been piloted so far. The study will also look to identify opportunities to link the nutrition sensitive cocoa concept to cocoa value chain training programs.

After briefly explaining what is included in the study and the methodology, this report provides a nutrition context analysis and an agriculture and cocoa sector context analysis. These analyses include results from both desk study and field work in the Nyinahin sub-district, in which challenges and opportunities are highlighted. The report concludes by making recommendations on whether and how nutrition sensitive cocoa value chains in Ghana can be achieved. The target groups are projected to be the households of the cocoa farmers, in particular children under the age of two and women of reproductive age (WRA)

[1] http://worldcocoafoundation.org/about-cocoa/challenges/
[2] De Vries, K., McClafferty, B., Van Dorp, M., Weiligmann, B. (2012): Increasing cocoa productivity through improved nutrition – A call to action, Concept Brief.

Box 1: Why address under-nutrition through cash crops like cocoa?

Indicators of under-nutrition in areas where cash crops such as cocoa, coffee and tea are sourced are often alarmingly high. Stunting, a key indicator for under-nutrition, is considered to be at an alarming level when it is above 25%. In most cash crop producing areas in African and Asian countries the stunting rates are higher than 25%. In many cases, more than 40% of children under the age of five are stunted.

On the other hand, the sourcing of cash crops might provide a small window of opportunity in that involved farmers often have more resources at their disposal than most subsistence farmers. However, reality shows that generally farmers do not use these resources to improve the quality of diets. Although there are also methods to support subsistence farmers, the additional (limited) resources possibly provide a higher chance to structurally address under-nutrition.

Traders and companies have an interest in cash crop farmers to perform well and deliver good qualities and quantities of, for example, cocoa to maintain their business. As under-nutrition weakens physical and mental abilities, so does it limit labour performance and productivity. In other words: by addressing under-nutrition of farmers and their families, companies take care of farmers and their households and at the same time they contribute to increasing productivity and quality.

2 Subject of the study and methodology

The study takes into account key characteristics of both cocoa farming and nutrition to establish whether nutrition sensitive cocoa farming could be realised in Ghana. After establishing the context with regard to cocoa farming and nutrition the study zoomed in on one cocoa producing sub-district because this focus allows for the collection of detailed data, which enables the provision of well-informed recommendations. The selected sub-district was that of Nyinahin (Ashanti province). Cocoa farmers and their households are the target group, which for the latter is with regard to dietary habits. The field work, background study and lessons learned from agriculture-nutrition linkages projects are to provide insight in the challenges and opportunities to stimulate a nutrition sensitive cocoa value chain in Nyinahin. Quantitative and qualitative data were collected locally in individual and group discussions with farmers and women. The recommendations that follow from the study could also apply in other cocoa producing areas in Ghana, although this should be confirmed through local quick-scans.

During the field study, there were individual and group interviews with women in Nynahin on nutrition and dietary habits. In individual interviews, women were asked what they had eaten the day before (24 hour recall). The aim was to include enough respondents to be able to make sound assessments on the dietary diversity of women. Dietary diversity is key because only consuming staple crops (e.g. cassava, maize and plantain) will not provide a person with the amounts of micronutrients, like zinc, iron and vitamins, that are necessary to develop fully as a child, build resistance against diseases and to be productive in life without suffering from continuous tiredness. The Individual Dietary Diversity Score (IDDS) is an indicator to assess whether food consumption habits are diverse enough to obtain the required micronutrients to avoid under-nutrition. Since there were enough, an IDDS can be provided.

Box 2: Why an IDDS?

Nutritionists consider dietary diversity as important in assessing whether a person is eating healthy. However, it is complicated and costly to measure what people eat, especially when a large group of people is monitored to make reliable assumptions. A solution is to apply the IDDS, which is relatively easy and cheap. The score qualifies what people eat in terms of diversity of a diet. Food consumed by a person is listed and divided in ten food groups. A person gets one point for each food group from which an item is consumed. The rationale is that when a diet is diverse, so are the micronutrients a person obtains. The IDDS for WRA is scientifically validated to represent the quality of a diet. Donors and development practitioners increasingly apply the IDDS.

To get the IDDS women are asked what they ate the day before the survey is taken. This sample provides an overview of what a person eats in one day. When the number of people taking the interview is high enough, this provides a reliable image of the IDDS of a particular group.

Example: a person in one day eats cassava, tomato and plantain and drinks milk. Tomato goes in the ‘other vegetables group’, milk in the ‘dairy group’ and plantain and cassava go into the group of ‘All starchy staple foods’. Because you can only get one point per food group, the IDDS of this person is 3.

See: ‘FAO (2014), Introducing the Minimum Dietary Diversity, Women (MDD-W) Global Dietary Diversity Indicator for Women’.

Next to asking women individually about their dietary habits, in focus group discussions they were asked about household dynamics. These discussions included questions on how food is prepared, who decides to buy food, on what basis these decisions are made, where food is bought, etc. The answers are used to provide insight into attitudes that determine dietary habits, specifically those of women and children. Individual interviews were also conducted with cocoa farmers about their farms and their attitude towards production of other commodities. The rationale behind these individual interviews is to get an image of the current (attitude towards) production of food crops, opportunities and challenges at cocoa farms to increase production of nutritious food crops. All the cocoa farmers interviewed were men.

Officers of government offices of agriculture, cocoa and health (nutrition) were interviewed as well to test the attitude of local government officials with regard to nutrition interventions in agriculture, enquiring what relevant government programs are in place and obtaining additional data. A market scan was also done by visiting several local markets and kiosks. The vendors were asked about the sourcing and availability of products that they sell throughout the year. The purpose of the market scan was to contribute to an overview of the availability and accessibility of food throughout the year.

3 Nutrition context in Ghana and the Nyinahin sub-district

Across Africa, people remain affected by under-nutrition.[3] Under-nutrition indicators in Western Africa hardly differ from those in the rest of sub-Sahara Africa. Ghana, however, is doing better than most of its neighbouring countries in terms of key under-nutrition indicators (e.g. stunting, low birth weight).[4] Agriculture development, in combination with policies aimed at addressing under-nutrition, in Ghana is believed to have led to improvements in nutrition. Food supply per capita in Ghana is above 2,600 Kcal/capita/day, which makes the country largely self-sufficient in staples. Furthermore, prices of food have gone down and the income of small farmers has increased.[5]

Although Ghana has shown progress and is doing well compared to surrounding countries, under-nutrition indicators are still worrying. This is also true for the main cocoa producing region of Western Ghana, where 23% of children are stunted and 5.5% are severely stunted.[6] This can probably be explained by a high consumption of staples and a lack of consumption of food that contains necessary micronutrients (e.g. Vitamin A, iron and zinc), as figure 1 illustrates. This is specifically affecting young children, as bad child feeding habits are generally the cause of high levels of under-nutrition.[7]

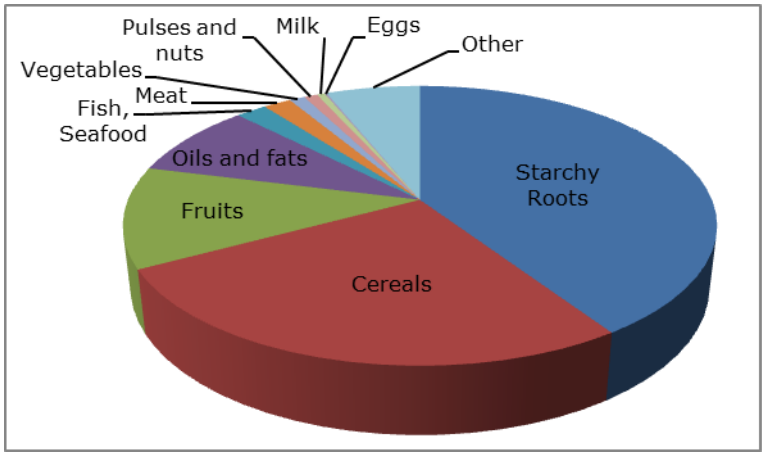

Figure 1: *Food supply (kcal/capita/day) Ghana (2011)*[8]

Stunting levels in the main cocoa producing area of Western Ghana were at nearly the same level as the country average. However, average stunting rates in rural areas in Ghana were 11% higher than the average rate in urban areas.[9] This means that under-nutrition levels are still causing problems especially in the rural areas, which includes the cocoa producing areas. For example in health, as people are more susceptible to catch diseases like diarrhoea which can be fatal for children and is a burden on the health system.[10] This contributes to a mortality rate of children under five of 7.2%.[11] Under-nutrition also causes losses in productivity which, given the labour intensive nature of cocoa farming, also affects the cocoa sector. How well people grow depends on how healthy their diet is. It is

[3] Black, R et al (2013), Maternal and child undernutrition and overweight in low-income and middle-income countries, *The Lancet*, Volume 382, p. 427–451.
[4] Demographic health surveys of Ghana and neighboring countries at http://www.dhsprogram.com/
[5] Wiggins, S. and Leturque, H. (2011), Ghana's sustained agricultural growth, p. 8.
[6] Ghana Statistical Service (2015), Demographic and Health Survey 2014, p. 26.
[7] UNICEF (2012), infant and young child feeding.
[8] http://faostat.fao.org/site/368/DesktopDefault.aspx?PageID=368#ancor
[9] Ghana Statistical Service (2015), Demographic and Health Survey 2014, p. 26.
[10] Guerrant, R. et al (1992), Diarrhea as a cause and an effect of malnutrition: diarrhea prevents catch-up growth and malnutrition increases diarrhea frequency and duration.
[11] http://www.unicef.org/infobycountry/ghana_statistics.html

argued that a 1% reduction in height leads to 1.4% reduction in productivity.[12] Another example is anaemia, in which case a 1% reduction in iron status leads to a loss of 1% in productivity.[13] Also, undernourished children are known to have significantly lower cognitive development, indirectly affecting productivity.[14]

Household food consumption habits in Nyinahin sub-district

Focus group discussions with groups of women in villages surrounding Nyinahin provided relevant input on food consumption dynamics in households. Women were asked about their dietary habits, as women take care of children and carry children before they are born. In general, women collect food for the entire household to consume. Women have their own budget for food and they can decide how to spend it. In a different cocoa producing district in the west of Ghana, it was confirmed that women who earn money by selling food do not have to give it to their husbands. They can use it to buy food for household consumption.[15] Women can obtain any kind of food they want for a meal, unless their husband indicates he wants a particular food on his plate. In that case, the woman obeys the man's wishes. Children also have a say in the food that is served and, although women do not have to, are often given their way.

Food can be acquired commercially (bought at the local market, from hawkers, kiosks, vendors at the side of the road or cold stores) or by collecting food at the farm. As women generally also work at the cocoa farms during the day, they bring back food from the farm. Women are also in general the ones that cook, but when women are sick or travelling for example men also cook. The older children are able to cook and will when mother and father are working long days on the farm, but these are incidental.

As most of the villages are built on rock soil, there is hardly any chance to have kitchen gardens near houses. Where this is possible, women indicated that they do not have kitchen gardens, as most of the crops would be eaten by goats and chickens. Women that did have a kitchen garden were exceptions.

In general, women indicated that they have two or three meals per day. This depends on whether they are working at the farm, when they do they do not have chance to cook a meal. In that case, they grab for example some fruit at the farm if possible. Additionally, women said in the focus group discussions that daily they eat one or more snacks in between meals in the form of fruit or nuts.

Dietary diversity in Nyinahin sub-district

Unfortunately, no official data on malnutrition indicators are available for the Nyinahin sub-district. Dietary habits to a large extent determine indicators such as stunting and low birth weight. Therefore, the study focussed on determining an IDDS through a survey among 56 women. Pregnancy is a key period for the physical development of a human being. Under-nutrition of the mother during this time will have a lasting effect on the life of the child, especially in the first thousand days after conception.[16]

[12] Hunt, J. (2005), The potential impact of reducing global malnutrition on poverty reduction and economic development, *Asia Pacific Journal of Clinical Nutrition*, 14(S), p. 10-38.
[13] Behrman, J. and Rozenzweig, M. (2001), The returns to increasing bodyweight.
[14] Grantham-McGregor, S., Fernald, L and Sethurahman, K. (1999), Effects of health and nutrition on cognitive behavioural development in children in the first three years of life, *Food and nutrition Bulletin,* 20(1), p. 53-99.
[15] Van Elzakker, B., Van Esveld, D. and Oppong, D. (2011), Cocoa women & food business, p. 9.
[16] Miese-Looy, G., Rollings-Scattergood, J. and Yeung, A. (2008), Long-term health consequences of poor nutrition during pregnancy.

Table 1

IDDS scores for 56 respondents (Average = 4.29)[17]

IDDS	Frequency (# of persons)
2	3
3	10
4	19
5	18
6	4
7	2

An IDDS of 4.29 was found, which means that, on average, the interviewees daily consume food from 4.29 out of 10 food groups. An IDDS score of 5 or higher will probably result in intake of sufficient micronutrients. The IDDS found in the study is thus too low from a nutrition perspective, but is close to a sufficient score. It should be noted that the study was done at the end of the rainy season and that food supply, also in terms of the more nutritious food such as vegetables, was high. A different study in a cocoa producing area in Western Ghana showed that people are perceived to be weaker during the lean season when food supply is lower. This could (partly) be caused by lower or less diverse food intake.[18]

Broadly, the food groups consumed by the people in Nyinahin can be divided into three categories: food groups that are nearly always consumed, food groups that are sometimes consumed and food groups that are hardly consumed. The food groups that are nearly always consumed are staple crops, flesh foods and other vegetables. 'Other vegetables' are those that are not rich in Vitamin A. The reason that almost everyone consumes these three food groups is a stew that is consumed in most households. The stew consists nearly always of the same ingredients, which are dried fish (from the flesh foods group) and tomato and onions (from the other vegetables group). Half of the time garden eggs, the local variety of African eggplant, is added. Red pepper is normally also added, but portions are too small to obtain significant micronutrients and it does not qualify as an added food source. Staple crops are consumed with this stew, commonly with the plantain and cassava based 'Fufu' but also with Rice, yam or banku.

Table 2

Food groups consumed by % of interviewed women[19]

Food groups nearly always consumed:	
Staple crops (plantain, cassava, yam, rice, banku)	98%
Flesh foods (dried fish)	96%
Other vegetables (tomato, onion, garden egg/eggplant, okra)	78%
Food groups sometimes consumed	
Beans and peas (white beans, ground nuts)	55%
Dark green leafy vegetables, Vit A rich (Kontomire, taro leafs)	39%
Food groups hardly consumed	
Dairy products (milk)	16%
Nuts and seeds (palm nuts)	11%
Other Vit A rich vegetables and fruits (Papaya)	11%
Other fruits (Bananas, oranges)	11%
Eggs	7%

[17] IDDS survey Nyinahin
[18] Van Elzakker, B., Van Esveld, D. and Oppong, D. (2011), Cocoa women & food business, p. 7.
[19] IDDS survey Nyinahin

The high consumption of the stew together with staple crops makes nearly 95% of interviewees score an IDDS of 3 or higher. Those with an IDDS lower than 3 said they skipped one meal the day before the survey. The high rate of consumption of at least three food groups is a stable basis for a higher IDDS. However, the food groups that are nearly always consumed do not include the food groups that provide the highest level of micronutrients.

The food groups that are sometimes consumed do include those with foods that contain high level of micronutrients. An example is food group 'Dark green leafy vegetables' of which the only commodity that is consumed is Kontomire, also known as Taro leaves. Kontomire is consumed by adding substantial amounts to soups. The 'Beans and peas' food group also qualifies as 'sometimes consumed', where consumption mainly consists of white beans consumed in stews and ground nuts in the form of a paste.

What is left are the five food groups that are hardly consumed by the female respondents, which includes groups that could provide key micronutrients to counter under-nutrition. They are 'Dairy products', 'Nuts and seeds', 'Other fruits', 'Other Vitamin A rich vegetables and fruits' and 'Eggs'. 'Other Vitamin A rich vegetables and fruits' includes all Vitamin A rich varieties except those that go into the green leafy vegetables group. The former food group includes papaya, which is the fruit that is consumed most by the group of interviewees. The 'Other fruits' food group includes those fruits that are not rich in vitamin A. The 'other fruits' food group in this case consists of bananas and oranges that are consumed. These are incidentally eaten when women are working in the cocoa farm, where fruit trees coincidentally grow.

There are many goats and sheep in the Nyinahin area who's meat is consumed, but not their milk. There are hardly or no cows in the area, which partly explains the low consumption of milk. Chickens are present in all villages in the area, but eggs are not regularly consumed. Mostly, the eggs hatch and the chicks are raised for meat or in some cases the eggs are sold. For all the interviewees for who a point to the IDDS was added because of the consumption of 'Nuts and seeds', this was done because of the consumption of palm nuts. No other nuts are consumed, as ground nuts are considered to be a legume.

4 Cocoa farming in Ghana and the Nyinahin sub-district

Ghanaian society is to a large extent agriculturally oriented. Over 60% of the population makes a living from agriculture, which is dominated by smallholders. Agriculture's share of GNP was 22.2% in 2013.[20] Although agriculture sector growth is lagging behind GNP growth, Ghana is one of the top performers in the world in terms of agricultural growth.[21] The food crops produced are mainly staple crops and are consumed domestically.[22] On the list of exported commodities, cocoa beans are first in terms of value. Since the 1990s cocoa exports increased rapidly. With an estimated production of 835,000 MT of cocoa beans in 2012/2013, Ghana accounts for 21% of cocoa production worldwide. Only Cote d'Ivoire produces more.[23] Main cocoa bean export destinations are The Netherlands, Germany, United States and Brazil.

Within Ghana, the most cocoa beans are produced in the Western region. This region accounts to more than half of Ghana's cocoa production. Ashanti is the only other region to produce more than 100,000 metric tonnes of cocoa, followed by the Brong Ahafo and Eastern regions.[24] A study in Western Ghana showed an average cocoa farm size of 4.78 acres.[25]

Yield gaps on cocoa farms in Ghana remain large. This is because of relatively poor adoption of technologies by cocoa farmers and also because of low labour productivity levels, for example due to poor farm maintenance.[26] In addition, forest depletion and environmental degradation can be ameliorated by increasing production per unit area of land through adaptation of technologies that rely on labour, such as regular weeding, pests and disease control, pruning and shade management.[27]

Cocoa farming in the Nyinahin sub-district

The purpose of this part of the study was to obtain a profile on cocoa farmers in the Nyinahin area and establish their attitudes towards cocoa farming and growing food crops. To this end a total of forty-six male farmers were interviewed individually during the field work. All of the four interview sessions were followed by a visit to one or two cocoa farms to match the answers from the interviews with an impression of the cocoa farm reality.

Seasonal cocoa production in the Nyinahin sub-district has gradually increased from 7,352 tonnes of cocoa beans in 2008/09 to 11,821 tonnes in 2013/14.[28] The reason given for this increase are newly introduced cocoa varieties and a government pesticide program that reduced the prevalence of diseases since 2007. For the interviewed farmers there was a slight decrease in cocoa produce in the two previous seasons. On average, cocoa farmers that were able to provide production results harvested 17.8 bags of cocoa beans in 2012/13 and 16.2 bags in 2013/2014.[29] Farmers explained this decrease in harvest from less resources to spend on farm inputs, particularly on pesticide.

In the opinion of the farmers, pesticide is the key input to assure improved cocoa production results. Nearly all farmers buy their own pesticide and 60% also profit from the government spraying program, although most farmers feel that their own pesticide is more reliable than the pesticide used by the government. The farmers spray their cocoa farms on average 3.3 times per season. Using

[20] http://www.statsghana.gov.gh/gdp.html
[21] Wiggins, S. and Leturque, H. (2011), Ghana's sustained agricultural growth, p. 8.
[22] http://faostat.fao.org/CountryProfiles/Country_Profile/Direct.aspx?lang=en&area=81
[23] International Cocoa Organization (2014), Annual Report 2012/2013, p.60.
[24] World Bank (2013), Supply chain risk assessment cocoa in Ghana, p. 3.
[25] Larson, B. (2005), Household Health and Cocoa Production: A Baseline Survey of Smallholder Farming Households in Western Region, Ghana, p. 17.
[26] Aneani, F. and Ofori-Frimpong K. (2013), An Analysis of Yield Gap and Some Factors of Cocoa Yields in Ghana, *Sustainable Agriculture Research*, 2(4), p. 123.
[27] Ibidem, p. 125.
[28] Nyinahin district office of Cocoa Quality Control Company ltd.
[29] One bag of cocoa beans is approximately 64 Kilograms.

pesticide takes priority over manual labour to minimise spread of diseases. The approach does not seem very effective, as in all farms there was a high prevalence of diseases like Black pot and Tree cancer.

Cocoa farms around Nyinahin are very disorganised. Cocoa trees are spread across the farm randomly, as there is no system for allocation. This negatively affects cocoa farms in terms of productivity as it takes more labour to maintain a disorganised farm, for example when removing black pot from trees. This is hardly done in the farms visited during the field research. Also, chances to successfully diversify cocoa farms are highest when they are well organised. When not able to take care of cocoa trees or when it takes a lot of time, the probability of farmers maintaining other commodities that are not their main income will be lower. At well organised farms, diversification is best maintained and takes less effort.

Food crop production of Cocoa farms in the Nyinahin sub-district

Commodities other than cocoa produced in Nyinahin are plantain, cassava, maize, tomato, onion and cocoyam. Market vendors indicated that staple crops and most vegetables are available in Nyinahin throughout the whole year. Nevertheless, seasonality does have an impact on availability of food. For fruits there are particular months in which they are available. Mango from March to September, for example. In addition, prices can more than double when vegetables, like tomatoes, are out of season.

Food crops generally grow in the lower areas of cocoa farms close to water, which in most cases is a small stream. Areas near water are too moist for cocoa trees to grow and are used for other crops. Occasionally, cocoyam and kontomire plants can be found on farms, but in general the canopy of cocoa trees does not allow enough light for other crops to grow. The farmers interviewed during the fieldwork indicated that each of them on average grow 2.4 food crops. Not one farmer said that food is produced mainly for selling. 62.8% of the farmers said that produced food is used both for own consumption and selling, while 37.2% said that it is only for own consumption. The most common food crops are plantain, cassava and cocoyam. Others include fruits, such as mango and pineapple, and vegetables, like tomato, garden egg, chili pepper and okra. Kontomire was not mentioned by farmers in the survey, as they see it as a plant that incidentally grows in the farm. Only a few farmers keep animals (chickens or goats).

Table 6

Commodities grown by interviewed farmers (Total = 46 farmers)[30]

Food crop	# of farmers that grow commodity
Cassava	30
Plantain	26
Cocoyam	21
Tomato	5
Chili pepper	5
Maize	3
Okra, Pineapple, garden egg	2
Banana, Mango, Peanuts, Sugarcane	1

Water seems not to be a constraint for producing food crops as 95% of the farmers in the survey said that they have access to water. Most of these farmers have water sources near the farm all year long or can get water when needed. What could be a major constraint for farmers to start growing more food crops is their attitude. The main incentive for the interviewed male farmers to develop their farms is to increase income. As they do not see the financial benefits of growing food crops, most said they would prefer to focus on growing more cocoa trees and making the trees they currently have more productive. When asked if they would like to grow more commodities on their farm other than cocoa, 12 out of 46 farmers said that they would consider it. Out of this group of twelve, most think that most additional produce would be for commercial purposes but that they would also use a part for own consumption.

[30] Farmer survey Nyinahin

As farmers are mainly interested in growing more cocoa, they are also interested in improving their own skills to enable them to increase their cocoa production. When asked whether they would like to improve their skills, without any exception all farmers said they wanted to. When specifically asked which skills they would like to improve, the most common answers were pesticide and fertilizer application, pest and disease control and general agricultural practices. Although mainly wanting to do this to produce more cocoa, improving skills in general agricultural practices could also benefit food crop productivity. The same would, to a lesser extent, apply by improving skills in pesticide and fertilizer application.

Should cocoa farmers in Ghana be stimulated to grow more nutritious food crops, there should be an incentive that is clear and motivates farmers. Food crops produced, such as vegetables and fruits, can be used for own consumption and for selling, which would increase the availability of healthy food locally. As the farmers consume more healthy food, their health improves and productivity increases. Being healthier, in the long-run they will produce more cocoa while being less tired and increasing their income by selling more cocoa and more food to local markets. This also provides an income safety-net should cocoa harvests fail. However, income from nutritious food crops is perceived to be low and farmers chose not to invest time and energy.[31] Stimulating an increase in the demand for nutritious food crops, which can be done through nutrition awareness creation, would create an extra incentive for cocoa farmers.

If the consumption of the two food groups that are sometimes consumed increases from 47% to **71%** and the consumption of eggs and other fruits increases from 9% to **18%**, the IDDS of the people in Nynahin will increase from 4.29 to **5.3.**

[31] Van Elzakker, B., Van Esveld, D. and Oppong, D. (2011), Cocoa women & food business, p. 9.

5 Conclusion and recommendations

Increased dietary diversity of people in cocoa producing areas in Ghana will contribute to lower levels of malnutrition, which will result in less disease and lower mortality. Studies also show that improved nutrition status results in higher levels of productivity, because people are stronger, less tired and develop better cognitively. Since cocoa yield gaps in Ghana can partly be closed through applying labour intensive technologies better, increasing dietary diversity could very well stimualte higher productivity.

This study found an IDDS of 4.29 in the Nyinahin sub-district at a time when food supply was relatively high. It is expected that this score will be lower in the lean season. Three food groups (staple crops, flesh foods and other vegetables) are the basis of this IDDS, although they provide relatively low levels of micronutrients. An IDDS score of 5 would be satisfactory in terms of dietary diversity and provides a basis to address under-nutrition. The score of 4.29 would have to increase through the consumption of foods from additional food groups. The recommendations below take into account this ambition and agricultural context and attitudes. As it would be unwise to advocate an increase in the consumption of foods from one food group only, it is recommended to do so for several food groups.

Two food groups, 'Nuts and peas' and 'Dark green leafy vegetables', are sometimes consumed (55% and 39% of the time) and include commodities that provide high levels of micronutrients. The level of consumption shows foods from these food groups are available and accessible for people in Nyinahin, although the study was done at a time of the year when food supply was high. As dietary habits seem to allow for the inclusion of these foods in consumption patterns, it is advised that their production and consumption is encouraged. Crops that qualify are kontomire, papaya, white beans and ground nuts. Given the low number of cocoa farmers that grow these crops and the dietary acceptance of these crops, increasing production of these crops by cocoa farmers would be a key factor in boosting consumption. When available, women can use them in stews that they prepare daily. Complementary activities to raise awareness on the nutritional value are probably needed to significantly increase consumption of the mentioned crops. Especially for papaya, which is not used in stews but does have high nutritional value.

Although there seems to be significant availability of eggs, consumption is very low. In interviews women explained they are not accustomed to consuming them. In this case, awareness creation and recipe development could stimulate higher consumption of eggs. Given the currently low consumption and the availability of eggs, this could significantly increase dietary diversity. A risk is the impact of New Castle disease on poultry. Although there are reports that in Ghana the problems with this disease that is fatal for chickens are serious, it seems that in Nyinahin the impact is less than in other parts in Ghana.[32]

Nutrition awareness creation would also be necessary to raise consumption of palm nuts, from the 'Beans and seeds' food group, and of oranges and bananas of the 'Other fruits' food group. Here, the promotion of palm nuts is recommended, as they are rich in micronutrients. For bananas there is a way to increase availability that particularly applies to cocoa farming. Bananas cannot grow under larger cocoa trees, but farmers indicated that banana trees could serve as shadow trees for young cocoa trees. The banana tree would die when the cocoa trees outgrow it and shade it from sunlight. This would provide farmer households with improved access to fruit and at the same time serve a purpose for cocoa production.

[32] Van Elzakker, B., Van Esveld, D. and Oppong, D. (2011), Cocoa women & food business, p. 15.

Recommendations

Why not stimulate a sustainable increase in the productivity and quality of cocoa farms and at the same time tackle under-nutrition? There is an excellent opportunity to do so by integrating cocoa production and nutrition training. Increasingly companies are training cocoa farmers to improve production skills. In order to make cocoa farming more sustainable, it would be efficient to integrate a nutrition training component. The implementation of such a component can be done by using the same training infrastructure. The results of including nutrition training will also benefit cocoa farms through improved health and livelihoods and sustainable sourcing of cocoa from areas where under-nutrition indicators are currently high.

Integrating nutrition components in cocoa farmer training is crucial in order to create nutrition sensitive cocoa value chains. Improved cocoa farming and improved nutrition need to go hand in hand at cocoa farms and in training programs in order to show farmers the benefits of good nutrition in terms of improved health (of children) and that higher production of healthy commodities means less food will have to be acquired from markets. Their cocoa productivity and income will also increase, but this will be a gradual process and will only be visible by farmers themselves in the long run. Efforts are therefore needed to generate commitment of cocoa farmers to activities address under-nutrition, while key benefits will not be apparent the next day.

The results of cocoa farmer and nutrition training are thus linked. The approach of planting banana trees to provide shadow for young cocoa trees is only going to be successful when adopted as standard practice when training farmers how to plant cocoa trees. For this approach to work in the long run and stimulate cocoa farm diversification, cocoa trees need to be planted in groups of the same age and thus a structured approach to cocoa farming in general. This will also help to close the cocoa yield gap. It will for example be possible to remove black pot (manually) from cocoa trees in a systemic way.

To maximise the chances for success of nutrition sensitive cocoa value chains, schemes to improve cocoa production and nutrition status of cocoa farmers and their households should be presented in training as inseparable. In that way the chances that farmers will cherry-pick the parts that instantly increase cocoa production are minimised. Furthermore, models should be flexible so they can be adjusted to contexts (e.g. availability of water, distance to local market, distance to cocoa farm, space for kitchen gardens) and opportunities to stimulate access to healthy food. In the nutrition component of the cocoa training, farmers and their wives together can make their own plan to improve access to healthy food.

Good nutrition practices will be adopted in households when the women that collect and prepare the food prioritise the consumption of healthy food. Only training men will in most cases only achieve very limited results. In focus group discussions in the Nyinahin area, it was confirmed that women are usually the ones collecting and preparing the food. For this reason, a training program or another kind of program that raises nutrition awareness among men and women will probably be necessary to influence dietary habits. Such programs could include recipe development and cooking demonstrations. However, all women also work in cocoa farms on a daily basis. So again, there could be space for complementary cocoa and nutrition training activities which will also contribute to cocoa farm productivity.

Other recommendations include:

Work with role model farms

The program in Indonesia showed role model farmers that successfully adopt approaches can trigger a spill-over effect to other farmers. Other farmers recognise the improved farm practices, increased production and income and a change in attitude towards the importance of nutritious crops. This also supports (sustainable) capacity building, because it enables farmers to learn from role models.

Develop a nutrition manual for trainers

That helps explain the importance of good nutrition and highlights key nutritious commodities available in Ghana. The manual could also consist of recipes and guidelines for preparation of food and should be complemented by training materials that can be used in training sessions with farmers and women. WUR-CDI is involved in programs where such manuals are developed.

Reach both cocoa farmers (male and female) and cocoa farmer wives
With nutrition awareness creation efforts. Not only should there be specific nutrition awareness creation for the women that collect food that is consumed in the household, but also a nutrition component in cocoa farming training. As many women also work on cocoa farms, they could benefit from both nutrition and cocoa farming training.

Present cocoa growing schemes in such a way that it advocates healthy eating.
The two objectives should go hand in hand if cocoa farmers in Ghana are to adopt methods that include growing of nutritious food crops. When not inseparable, cocoa farmers will ignore the nutrition component because of their commercially driven attitude. In the long-run the nutrition component will benefit the farmer, for example in terms of productivity and income.

Points of entry
Several points of entry to integrate recommendations in Ghana's agriculture and related institutions are:

- Farmer business schools that are part of the Ministry of Cocoa Health educate cocoa farmers in doing business. This ministry and other sources said that, although evidence was not provided, there is a breach in the trend that the average age of cocoa farmers is increasing. Young farmers are starting to grow cocoa because it is considered a reliable source of income. From a nutrition perspective this is interesting, as younger men have young children and younger wives, including more WRA. These are the two key nutrition target groups that could be reached through farmer business schools
- The Ministry of Health has programs and extension officers focussing on nutrition. During the field work, the local office of the ministry was very cooperative and eager to explore further collaboration. There are programs in nutrition (e.g. nutrition awareness creation, especially on addressing anaemia) and there is a program in providing guidance for mothers on complementary foods for young children. They would also be a key partner in assessing impact of nutrition programs
- The Nyinahin office of the Ministry of Food & Agriculture has food crop programs. Their policy, however, seems to be fragmented as projects seem small, concern different commodities (vegetables, fruits, soybeans, livestock) and cross-cutting areas (processing, pesticide application). One program focussing on women in agriculture could perhaps link to a cocoa training program in which food crops also play a role, as women empowerment is key in programs promoting nutrition

Box 3: Key recommendations

- Include a nutrition component in the cocoa farmer training, raising nutrition awareness by advocating the benefits of nutritious food production and consumption
- Awareness creation of cocoa farming men and women, advocating the benefits of consuming of nutritious foods and providing them with ways to integrate nutritious food sources in local dietary habits
- Develop a manual and training materials that make it possible to implement a nutrition component in cocoa training. WUR-CDI has experience in developing such manuals for agriculture-nutrition training programs
- Showcase improved cocoa farming practice in coherence with methods to stimulate on-farm production of nutritious crops
- Work with the government of Ghana to institutionalise activities, for example through cocoa farm training centres. Coordinate with ministries (Cocoa health, Food & Agriculture and Health)
- WUR-CDI is in touch with Ghanaian nutritionists that could support nutrition training components
- Monitor and evaluate the effect on both cocoa production and nutrition status/dietary diversity. WUR-CDI has developed methods to measure results that can be tailored to a program in Ghana
- Work with projects that Wageningen UR is conducting in the cocoa sector in Ghana and with other nutrition oriented programs. WUR-CDI is able to serve as a link to those projects, could showcase the cocoa training program and let it benefit from lessons learned and good practice

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